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IS 10260-1 (1982): Terms, definitions and classification of plain bearings, Part I: Construction [PGD 13: Bearing]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
**TERMS, DEFINITIONS
 AND CLASSIFICATION OF PLAIN BEARING**
PART I CONSTRUCTION

1. Scope — Covers the most commonly used terms with their definitions and classification, applied to construction of plain bearings.

1.1 For some of the terms and word-combinations their short forms are given which are recommended for use when they are unambiguous. Self-explanatory terms are given without definitions.

2. General Terms

2.1 Bearing — A support or a guide by means of which a moving part is located with respect to other parts of a mechanism.

2.2 Plain Bearing — A support or a guide in which only sliding friction takes place.

2.2.1 Thick walled half bearing — A bearing liner having sufficiently thick wall to enable it to withstand the imposed loads without distortion. The bearing is sufficiently rigid and does not deform to take the shape of the housing into which it is fitted.

2.2.2 Thin walled bearing — A bearing liner which has the ability to take the shape of the housing into which it is fitted for the geometrical truth of the working surface that is bearing bore.

2.3 Plain Bearing Unit — Type of a tribological system including a plain bearing.

3. Types of Plain Bearings

3.1 Plain bearings are the following types

3.1.1 According to the direction of the supported load :

- a) Journal bearing,
- b) Thrust bearing, and
- c) Thrust-journal plain bearing.

3.1.2 According to the type of lubrication :

- a) Aerodynamic bearing,
- b) Aerostatic bearing,
- c) Hydrodynamic bearing,
- d) Hydrostatic bearing,
- e) Bearing with solid lubricant, and
- f) Unlubricated bearing.

3.1.3 According to the design :

- a) Plain self-aligning bearing,
- b) Tilting pad journal bearing,
- c) Pad thrust bearing,
- d) Pad journal bearing,
- e) Tilting pad thrust bearing,
- f) Lobed plain bearing,
- g) Self-lubricating bearing,
- h) Porous bearing, and
- j) Porous self lubricating bearing.

3.2 Plain Journal Bearing (Journal Bearing) — Plain bearing in which the load acts in a radial direction with respect to the axis of rotation.

3.3 Plain Thrust Bearing (Thrust Bearing) — Plain bearing in which the load acts along or parallel to the axis of rotation.

3.4 Thrust Journal Plain Bearing — Plain bearing in which the load acts in both the axial and radial directions.

3.5 Aerodynamic Bearing — Plain bearing designed for operation under the conditions of aerodynamic lubrication.

3.6 Aerostatic Bearing — Plain bearing designed for operation under the conditions of aerostatic lubrication.

3.7 Hydrodynamic Bearing — Plain bearing designed for operation under purely hydrodynamic lubrication conditions.

3.8 Hydrostatic Bearing — Plain bearing designed for operation under hydrostatic lubrication conditions.

3.9 Bearing with Solid Lubricant — Plain bearing designed for operation with solid lubricant.

3.10 Unlubricated Bearing — Plain bearing in which the relatively moving parts slide without preliminary applied lubricant.

3.11 Plain Self Aligning Bearing — Plain bearing the design of which provides for self-alignment of a liner with respect to the opposing surface.

3.12 Pad Journal Bearing — Plain journal bearing the bearing surface of which consists of several pads.

3.13 Pad Thrust Bearing — Plain thrust bearing the bearing surface of which consists of several pads.

3.14 Tilting Pad Journal Bearing — Plain journal bearing the bearing surface of which consists of several pads and each of them is free to align with respect to the opposing working surface of journal under the action of hydrodynamic (aerodynamic) pressure or load.

3.15 Tilting Pad Thrust Bearing — Plain thrust bearing the bearing surfaces of which consist of several pads each of which is free to align with respect to the opposing working surface under the action of hydrodynamic (aerodynamic) pressure or load.

3.16 Lobed Plain Bearing (Lobed Bearing) — Plain journal bearing in which several hydrodynamic wedges are developed round its periphery during operation, which is achieved with a special shape of the sliding surface.

3.17 Self-lubricating Bearing — Plain bearing lubricated by means of the bearing material and of bearing material components like grease, solid and fluid lubricants.

3.18 Porous Bearing — Plain bearing (bearing bush) made from sintered bearing material the pores of which may be filled with a lubricant.

3.19 Porous Self-lubricating Bearing — Porous bearing with pores filled with a lubricant accessible from the surface.

4. Structural Elements of Plain Bearings

4.1 Journal — Portion of a shaft (axis) supported by a plain journal bearing.

4.2 Thrust Collar — Detail connected with a shaft or a part of a shaft supported by a plain thrust bearing and transmitting the load acting in the direction of the axis.

4.3 Plain Bearing Housing (Bearing Housing) — Housing into which a liner (a bush) is fitted.

4.4 Plain Bearing Liner, Bearing Liner, Liner, Insert Liner — Replaceable part of a plain bearing, the inner surface of which is a rubbing surface.

4.5 Plain Bearing Bush, Bearing Bush, Bush — Tubular element of one piece plain journal bearing, the inner surface of which is the bearing bore.

4.6 Wrapped Bush — It is a cylindrical bearing, having a continuous split from one end to the other, manufactured from rolled material. This split may or may not be parallel to the axis of the cylinder. In its free stage, the wrapped bush may not be perfectly cylindrical, and its split may be open. The split is closed when the wrapped bush is fitted in housing.

4.7 Flanged Bearing Liner (Bush), Flanged Liner (Bush) — Plain bearing liner (bush) with a flange at one or both ends.

4.8 Thrust Washer — Annular plate usually used with a plain journal bearing, to support axial load.

4.9 Thrust Half-Washer — Part of a plate which, if combined with another similar part, forms a thrust washer.

4.10 Plain Bearing Half Liner, Bearing Half Liner, Half Liner — Part of a plain bearing liner extending 180° around the journal which, if combined with another similar part, forms a complete plain bearing.

4.11 Solid Liner (Bush) — Plain bearing liner (bush) made of one material.

4.12 Multilayer Bearing Liner (Multilayer Liner) — Plain bearing liner made of layers of different materials.

4.13 Bearing Liner Backing, Liner Backing, Backing — Layer in a multilayer bearing liner with a bearing alloy applied on it that gives the bearing the required strength and/or stiffness.

4.14 Bearing Anti-Friction Layer, Anti-Friction Layer — Layer of a bearing material in a multilayer liner.

4.15 Overlay Plating — An extra layer of soft metal (such as Lead-tin, and Lead-tin-Copper) over, what would otherwise be the sliding surface of bearing liner. The thickness of such soft layer is usually 0.025 mm and does not exceed 0.1 mm.

4.16 Flashing Layer — A very thin flash of pure tin or lead-tin applied to finished bearing as an protective anti-corrosive layer. The thickness of such flash which is electrolytically deposited, usually does not exceed one.

4.17 Bimetal (Tri-metal) Bearing Liner — A multilayer bearing liner made of two (or three) metals or alloys.

4.18 Micro Bearing Liner — A bearing liner in which the white-metal lining thickness is too thin (usually below 0.175 mm) to give them extra fatigue strength.

4.19 Pre-finished Bearing Liner (Bush) — A pre-finished bearing liner (bush) is one which can be fitted to the housing and used without further scrapping or machining.

4.20 Un-bored Bearing Liner (Bush) — An un-bored bearing liner (bush) is one that has to be bored/machined to the required size by user in order to use it in assembly.

4.21 Semi-Finished or Line Bored Bearing Liner (Bushes) — Bearing liners (bushes) which are semi-machined and the machining allowance so kept is suitable for reaming, burnishing, broaching or line boring for using in an assembly. The machining allowance for such bearing liners (bushes) is less than that for un-bored bearing liners (bushes).

5. Dimensional Characteristics of Plain Bearings

5.1 Gauge Diameter — Maximum diameter of bearing housing.

5.2 Plain Journal Bearing Inside Diameter — Diameter of a sliding surface of a plain journal bearing.

5.3 Bearing Spread — Outside dimension across parting line when measured in the free state.

5.4 Bearing Crush — Amount of peripheral length of half bearing which exceeds one-half of the circumference of the high limit bore, measured under specified load.

5.5 Eccentricity — A gradual reduction in bearing wall thickness from centre of bearing half to parting line relief creating additional theoretical clearance between bearing and journal to allow for bore distortion created by bearing crush and load deflection.

5.6 Parting Line (Joint Face) — The contacting surfaces between the two mating bearing halves.

5.7 Parting Line Height (Joint Face Height) — Dimension from plane of parting line to outside radius of back at centre of bearing with measured under load as specified by manufacturer.

5.8 Parting Line Relief (Joint Face Relief) — Moderate reduction in wall thickness adjacent to parting line to allow lubricant flow and prevent scrapping of oil film on journal as also to allow for bore distortion created by bearing crush.

5.9 Bearing Liner (Bush) Width, Liner (Bush) Width — Overall dimension of a bearing liner (bush) measured axially.

5.10 Diametral Plain Journal Bearing Clearance, Journal Bearing Clearance, Clearance — Difference between the inside diameter of the plain journal bearing bore and the diameter of the journal.

Note — A diametral plain journal bearing clearance may be either "calculated" or "actual".

5.11 Bearing Wall Thickness — Total thickness of bearing half which is the sum of back thickness, lining thickness and overlay thickness.

5.12 Straddle Gage — Inside dimension between flanges of a double flanged thrust bearing which is also referred to as "bar gage".

5.13 Locating Notch — A recess in the bearing housing bore provided to receive the locating lug of bearing.

5.14 Locating Lug (Locating Nick) — The projection at the joint face/parting line of a half liner provided to locate it during assembly, in the bearing housing. The locating lug is not meant to prevent rotation.

5.15 Locating Dowel Hole — When there is no provision of locating lug or nick in the bearing, dowel holes are provided to locate it during assembly, in the bearing housing.

5.16 Locating Ear — A projection on a thrust washer for locating it in the housing.

5.17 Locating Slot — A recess in the side of the bearing housing provided to receive the locating ear of a thrust washer.

6. Special Materials for Plain Bearings and Their Properties

6.1 Anti-Friction Material (Bearing Material) — Material possessing a complex of special properties providing for its use in plain bearings.

6.2 Sintered Bearing Material — Material made from compressed or sintered powders suited for use in plain bearings.

6.3 Frictional Compatibility (Compatibility) — Ability of a bearing material to prevent adhesion with the material of the shaft during friction.

6.4 Frictional Conformability (Conformability) — Ability of a bearing material to compensate for unsatisfactory initial adjusting to the mating surface by elastic and plastic deformation of the layer.

6.5 Embeddability — Ability of a bearing material to provide for embedding of hard particles to reduce their scoring or abrasion action.

6.6 Running in Ability — Ability of a bearing material to reduce friction force, temperature and wear intensity during running in.

6.7 Wear Resistance — Ability of a material to resist wear under specified friction conditions, expressed as the reciprocal of the wear rate of the wear intensity.

6.8 Relative Wear Resistance — Ratio of wear resistances of two bearing materials when they wear under similar conditions.

Note — Usually one of the materials is referred to as a standard material.

EXPLANATORY NOTE

The Content of this standard was earlier mostly covered in IS : 4757-1968 'Dimensions for wrapped bushes and thrust washers' and IS : 4774-1968 'Thin-walled bearing and thrust half-washers'. On the basis of the current international practices, the concerned committee felt the necessity to bring out a separate standard on Plain Bearing terminology to make it in line with ISO/DIS 4378/1 'Plain bearing vocabulary — Part 1 — Construction' ISO/DIS 4378/2 'Plain Bearing — Vocabulary Part 2 — Friction and wear' and ISO/DIS 4378/3 'Plain Bearing — Vocabulary Part 3 — Lubrication' issued by the International Organisation for Standardization. The standard consists of the following parts :

IS : 10260 (Part I) - 1982 Terms, definitions and classifications of plain bearing : Part I Construction

IS : 10260 (Part II) - 1982 Terms, definitions and classifications of plain bearing : Part II Friction and wear

IS : 10260 (Part III) - 1982 Terms, definitions and classifications of plain bearing : Part III Lubrication

These standards have been prepared for the guidance of the manufacturers and consumers to assist them for the correct interpretation of the terminology related to the plain bearings.